

REMARKS

Claims 11-20 are pending in this application. Claims 11-17 have been rejected. Claims 18-20 have been objected to.

Claims 11-17 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over each of WO '529/ DE '123. The Examiner asserts that each of the references teaches liquid crystal oligomers having ester linkages in the backbone and terminated by imide groups that are used to form thermoset polyesters. She states that the claimed oligomer mixture does not distinguish over the imide terminated oligoesters of the references or it would have been obvious to form mixtures of the imide terminated oligoesters and use for their intended purpose of forming thermoset polyester. Claims 11-17 are also rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Hoyt, "Lyotropic Liquid Crystalline Oligomers for Molecular Composites", pages 477-478. The Examiner asserts that Hoyt teaches liquid crystal oligomers terminated by imide groups that are used to form thermoset matrix, and states that the claimed oligomer mixture does not distinguish over the imide terminated oligomers of Hoyt or it would have been obvious to form mixtures of the imide terminated oligomers and use for their intended purpose of forming thermoset matrix.

Applicants respectfully traverse the Examiner's rejection of claims 11-17 under 35 U.S.C. 102(b) and 35 U.S.C. 103 in view of WO '529, DE '123 and Hoyt. Applicants have amended claims 11 and 12 to clarify that the oligomers described and claimed in the present application have been prepared by a *melt condensation technique*. Support for such an amendment may be found on page 5, lines 5-8 of the Specification. No new matter has been added.

As amended, Applicants believe the claims 11- 17 are clearly distinguishable over the cited art. The cited art describes liquid crystalline oligomers made by a solution polymerization process. The oligomers claimed herein, however, were made via a *melt condensation technique*, thereby making the use of solvents obsolete. In addition, the melt condensation technique described in the present invention is cheaper and more

environmentally benign. As amended, Applicants believe claims 11-17 are novel and non-obvious, therefore, a rejection under 35 U.S.C. 102 and 103 is improper.

The Examiner has objected to claims 18-20 as being dependent on a rejected base claim, but has indicated such claims would be allowable if rewritten in independent form.

Applicants have rewritten claims 18-20 in independent form. Applicants believe these claims are in condition for allowance.

Attached hereto is a marked-up version of the changes made to the claims. The attached page is captured "Version with Markings to Show Changes Made."

CONCLUSION

Applicants submit the claims are allowable over the cited art. An early allowance of the claims is requested.

Respectfully submitted,

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June 9, 2003

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or

757-864-3230

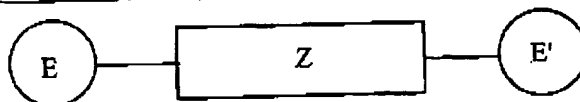
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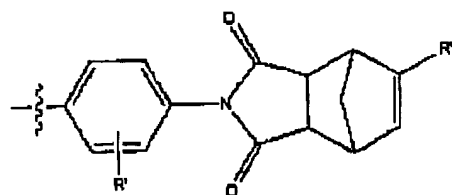
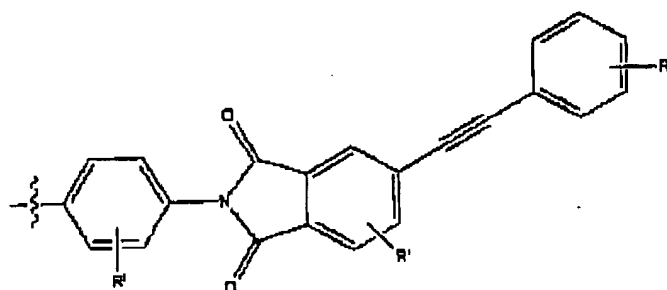
In the Claims:

11. (Amended) An oligomer mixture with self-reactive end-caps prepared by a melt condensation process, comprising the general structure:

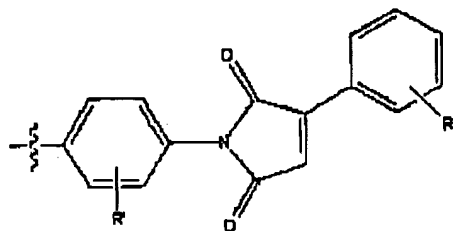


wherein Z is a liquid crystal backbone of the oligomer mixture selected from the group consisting of an ester, an ester-imide and an ester-amide,

wherein E and E' are selected from the group consisting of



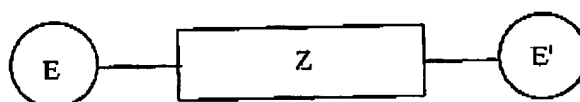
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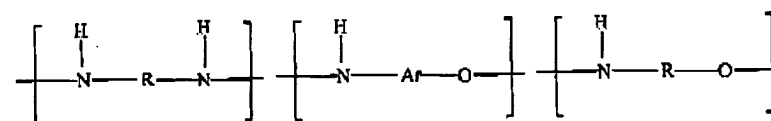
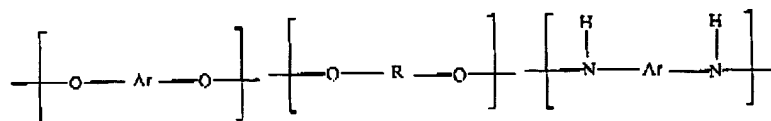
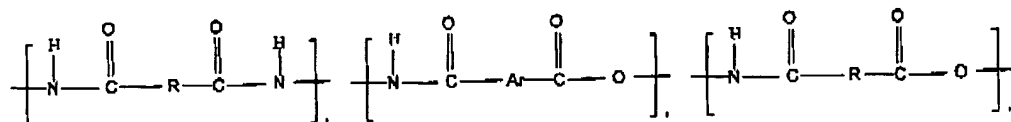
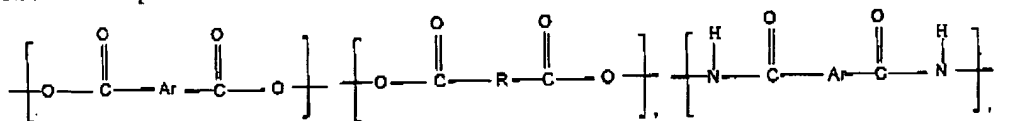
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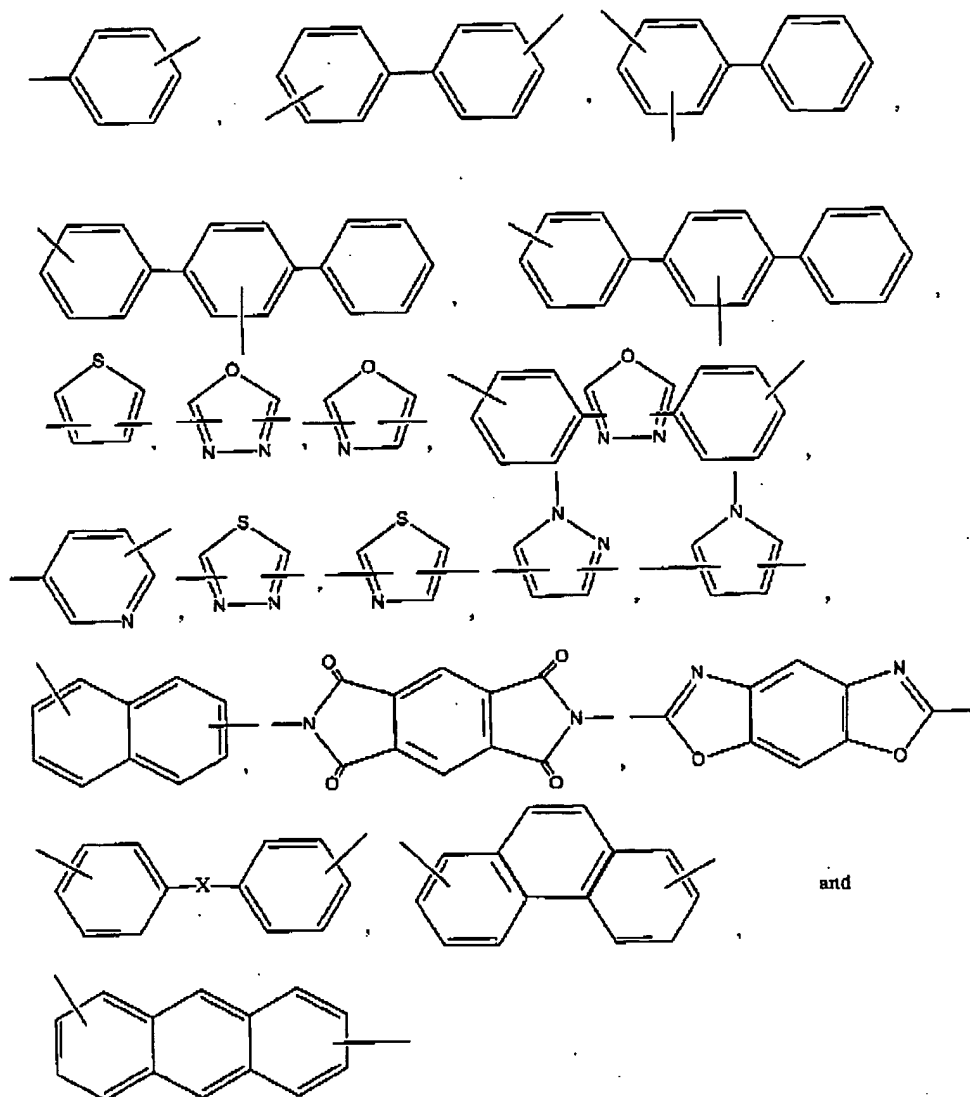
wherein R' is selected from the group consisting of hydrogen, alkyl groups containing six or less carbon atoms, aryl groups containing less than ten carbon atoms, lower alkoxy groups containing six or less carbons, lower aryloxy groups containing ten or less carbon atoms, fluorine, chlorine, bromine, and iodine.

12. (Amended) An oligomer mixture with self-reactive end-caps prepared by a melt condensation process, comprising the general structure:

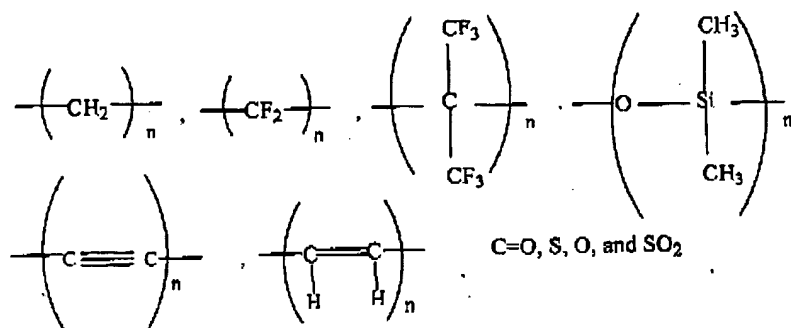


wherein Z is a liquid crystal backbone of the oligomer mixture having at least one structural repeat unit selected from the group consisting of



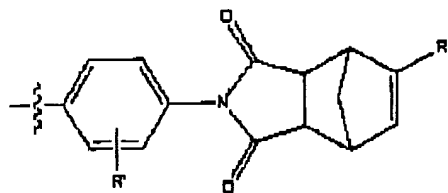
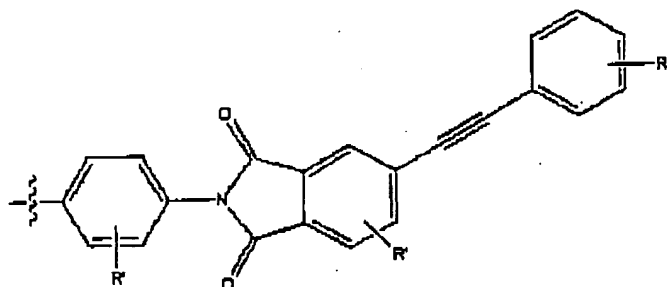


wherein X is selected from the group consisting of

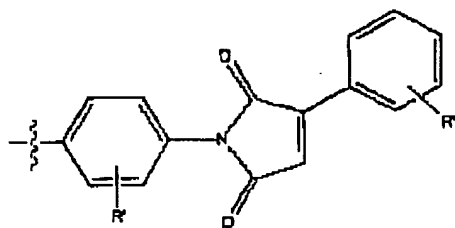


wherein n is a number less than 500,

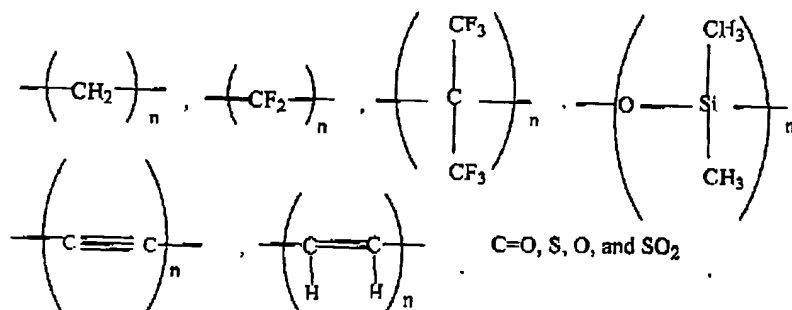
wherein E and E' are selected from the group consisting of



, and

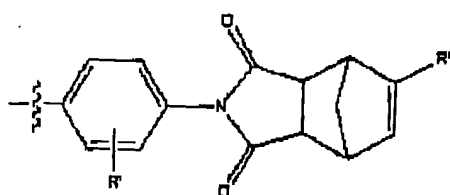
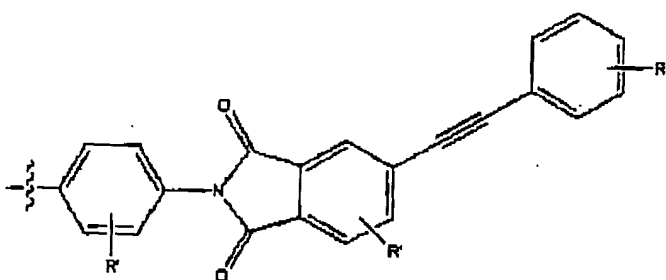


wherein X is selected from the group consisting of

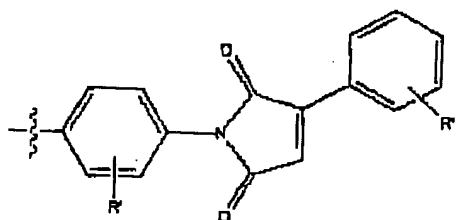


wherein n is a number less than 500,

wherein E and E' are selected from the group consisting of



, and



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wherein R' can be selected from the group consisting of hydrogen, alkyl groups containing six or less carbon atoms, aryl groups containing less than ten carbon atoms, lower alkoxy groups containing six or less carbons, lower aryloxy groups containing ten or less carbon atoms, fluorine, chlorine, bromine, and iodine.

13. (Previously Added) An oligomer mixture with self-reactive end-caps as claimed in claim 11, wherein E and E' are identical.

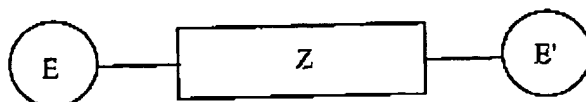
14. (Previously Added) An oligomer mixture with self-reactive end-caps as claimed in claim 11, wherein the molecular weight range of the oligomers is between approximately 1000 and approximately 15,000 grams per mole.

15. (Previously Added) An oligomer mixture with self-reactive end-caps as claimed in claim 11, wherein the melt viscosities of the oligomer mixture is between approximately 1 and approximately 250 poise at approximately 200° C to approximately 350° C.

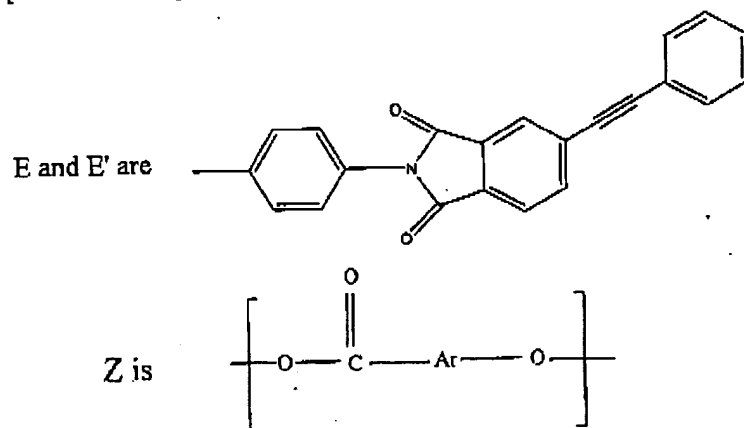
16. (Previously Added) A polymer product comprising an oligomer mixture with self-reactive end-caps according to claim 11 wherein said product is prepared by a process selected from the group consisting of melt processing, molding, fiber spinning, reactive injection molding (RIM), resin transfer molding (RTM), resin film injecting (RFI), powder molding, injection molding, blow molding, thermo-forming, plasma spraying, and pultrusion molding.

17. (Previously Amended) The polymer product of claim 16 wherein said product is a form selected from the group consisting of a fibre, filament, coating, film, lining, tube, pipe, sheath, sheet, and panel.

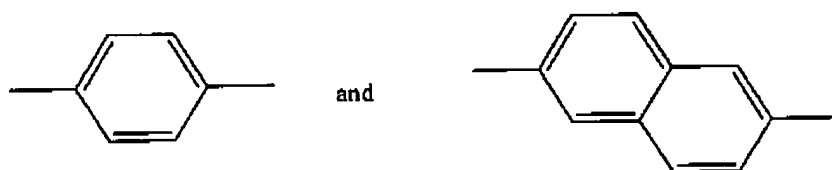
18. (Amended) An oligomer mixture with self-reactive end-caps comprising the general structure



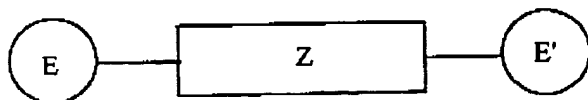
[as in claim 12] wherein



wherein Ar is

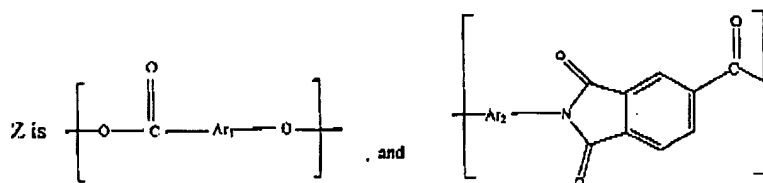
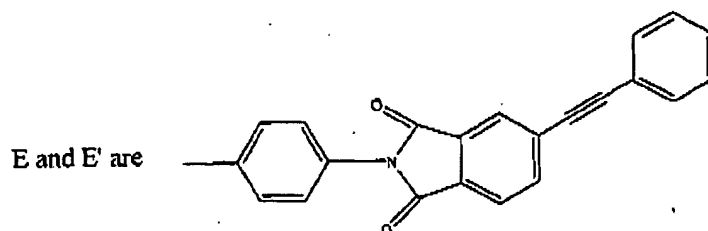


19. (Amended) An oligomer mixture with self-reactive end-caps comprising the general structure

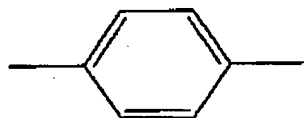


[as in claim 12] wherein

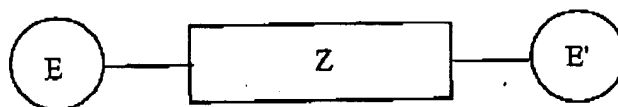
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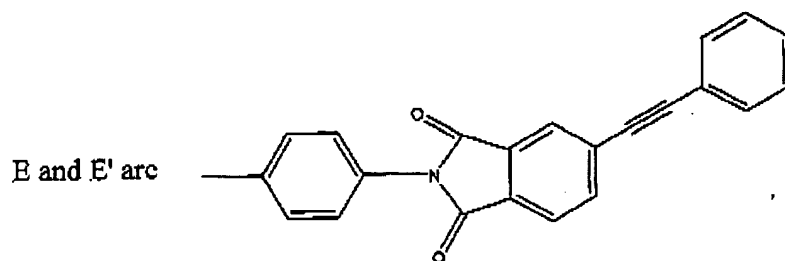
wherein Ar₁ and Ar₂ are



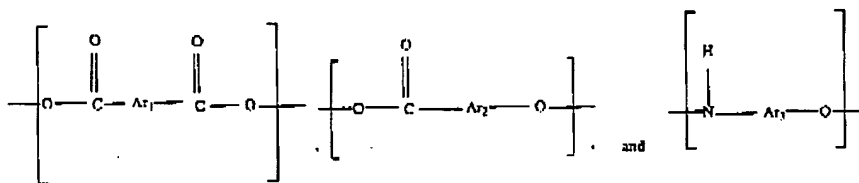
20. (Amended) An oligomer mixture with self-reactive end-caps comprising the general structure



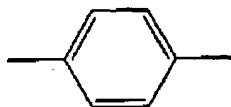
[as in claim 12] wherein



and Z is selected from the group consisting of



where Ar₁ and Ar₃ are



and Ar₂ is

